Case report

A 42-year-old woman with bronchiectasis had received an anti-influenza vaccination four years earlier. She had reacted to this and developed an unsightly, deeply pitted scar in the middle of her left arm. The scar measured 3 cm × 3 cm with the central pit reaching "down to the bone." There was no evidence of tethering of soft tissues in the scar to bone below or skin above (see figure).

On 27 February 1976, when she was in hospital for an incidental illness, treatment of the scar was started. Monocomponent porcine soluble insulin was injected in doses of 4 units three times a day before meals. The injection was given subcutaneously with about equal quarters of the dose being injected into each quadrant of the pit, so that the insulin was layered evenly at the base of the scar. Subjectively, clinically, and biochemically she showed no evidence of hypoglycaemia.

Once treatment had been established she left hospital on the sixth day and continued the injections at home, with her husband carrying out the above procedure as instructed. A month later the deep pit had reduced to a mere dimple. On 18 May 1976, after 82 days' treatment, the daily insulin treatment was discontinued as the arm appeared completely normal and no residual evidence of the previously ugly scar could be discerned (fig 2).

At the time of writing, seven months later, the restored area of the arm remained normal.

Discussion

While any type of insulin would have served in this case, monocomponent porcine insulin was chosen on the theoretical basis of its greater purity and fewer potential local complications.

It is well established that insulin is an anabolic hormone in fat and protein metabolism. Adipose tissue is exquisitely sensitive to insulin, because very small quantities of insulin inhibit lipolysis. The role of insulin in inhibiting lipolysis and stimulating fat synthesis is not clearly understood.[2] Crofford[3] has shown in isolated fat cells that the uptake, binding, and destruction of insulin by adipose cells are intimately associated with metabolic effectiveness.

Wool *et al*[4] showed that animal heart or diaphragm muscle incorporated radioactive amino-acids into protein at a much slower rate when deprived of insulin; when insulin was added to the medium the rate of protein synthesis increased within five minutes, even in the absence of glucose. The proposed sequence of protein synthesis by muscle ribosomes included the effect of insulin on translation of messenger ribonucleic acid for a regulatory protein.[5]

Insulin's role in promoting fat and protein synthesis has long been recognised. To use that property to rectify the above type of disfigurement seemed only logical and proved rewarding, not just cosmetically but also psychologically for the patient. The technique is simple, cheap, painless, and worthy of wider use.

I thank the Director-General of Medical Services (RAF) for permission to report this case.

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SHORT REPORTS

Acute intravenous zinc poisoning

Zinc is an essential element which is now added routinely to parenteral nutrition regimens.[1] Failure to do so may result in acute zinc deficiency,[2] but caution is needed because high concentrations are toxic.[3] We report a case of acute fatal zinc intoxication after an inadvertent intravenous overdose.

Case report

A 72-year-old woman was referred to St Mary's Hospital with a high-output enterocutaneous fistula after a second small bowel resection for Crohn's disease. Total parenteral nutrition via a subclavian catheter was begun: the fistula closed within 48 hours and in the next 26 days she gained 5·3 kg. The serum zinc concentration rose from 8 to 14·4 μmol/l (52·3-94·1 μg/100 ml) (normal range 11·5-19 μmol/l (75·2-124 μg/100 ml)). Because of her satisfactory progress she was transferred back to her original hospital, where arrangements were made to continue parenteral nutrition. Owing to a local prescribing error, however, she received 46 mmol (7·4 g) of zinc sulphate over the next 60 hours and was returned acutely ill to St Mary's.

The initial characteristics of the illness were hypotension (blood pressure 80/40 mm Hg), pulmonary oedema, diarrhoea and vomiting, jaundice, and oliguria. This bizarre clinical picture led to a thorough review of her treatment, and zinc intoxication was confirmed by analysing the intravenous solutions prescribed and by a serum zinc concentration of 640 μmol/l (4184 μg/100 ml). Her subsequent progress was fluctuating but unfavourable. Chelation with sodium calciumedetate was discontinued because of poor renal function. Despite an initial diuresis in response to intravenous fluids and frusemide she remained oliguric, and after a further period of hypotension had a blood urea concentration of 61 mmol/l (367 mg/100 ml) and a creatinine clearance of zero. Haemodialysis was undertaken nine times without significant improvement in renal function. Other features of her illness were cardiac arrhythmias and hypotension; hyperamylasaemia (maximum level 3460 IU/l) without evidence of acute pancreatitis; a predominantly but not exclusively cholestatic liver function profile, which slowly resolved; acute anaemia (haemoglobin 7·5 g/dl) and thrombocytopenia (14×10^9/l) by the fifth day; later septic complications with herpes zoster and then *Candida albicans* and klebsiella septicaemia. She died on the 47th day of illness, with bronchopneumonia.

The salient features at necropsy were: resolving acute tubular necrosis of lower nephron nephrosis type; oedema, macrophage infiltration, and widespread hyaline membrane in the lung; mild centrilobular congestion, scanty bile thrombi, portal tract expansion without increased cellularity, and slight bile duct reduplication in the liver; old ischaemic myocardial fibrosis; and changes consistent with, but not diagnostic of, Crohn's disease in the remaining small bowel.

Comment

Zinc poisoning has been described after oral administration,[3] inhalation,[3] and haemodialysis.[4] The lethal dose is unknown and the symptoms of severe ingestational poisoning are non-specific: vomiting, diarrhoea, fever, lethargy, and muscle pain and stiffness. Some of these, together with profound anaemia, occurred in a patient on haemodialysis with zinc-contaminated water.[4] Acute renal failure and acute pancreatitis have also been described.[3] Zinc seems to be a diffuse cellular toxin which can produce multisystem failure—a feature consistent with the rapid uptake by liver and kidney of most of an injected tracer dose.[5]

Treatment of zinc intoxication must depend on the specific organ failure displayed. Haemodialysis with a zinc-free dialysate is effective in reducing serum concentration, though the kinetics of zinc movement across the membrane are complicated.[4] Chelating agents remove serum and tissue zinc by increasing excretion. We record this case to

emphasise another potential danger of additives in parenteral solutions and to underline the desirability of using prepared solutions of known concentration.[1]

Full details of this patient's condition may be obtained from GG.

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St Mary's Hospital, London W2
ASHLEY BROCKS, DCH, FRCS, registrar in surgery
H REID, MB, MRCPATH, senior registrar in histopathology
G GLAZER, MB, FRCS, consultant surgeon

Reiter's disease after Salmonella typhimurium enteritis

I report possibly the first case of Reiter's disease after *Salmonella typhimurium* enteritis.

Case report

A 12-year-old girl was admittted to hospital in February 1976 with an acute polyarthritis. Two weeks previously she had developed frequent loose bloody stools, for which she had been given a kaolin and neomycin mixture, the diarrhoea settling after one week. She then remained well until three days before admission, when her mother noticed that her right eye looked inflamed. She also had terminal burning on micturition but no frequency. Two days before admission she developed painful swelling of the left knee, right elbow, and right wrist.

She did not look ill but her temperature was 38·8°C. She had bilateral conjunctivitis and mild pharyngitis. The left knee was hot, red, and swollen with an obvious effusion, and pain limited flexion to 40°. The right wrist and elbow were also hot and swollen with limited movement. There was no rash or lymphadenopathy, and the urethral orifice did not look inflamed. She had a tachycardia of 130/min and a moderate midsystolic ejection murmur. Haemoglobin was 14·0 g/dl; white cell count $10{\cdot}9 \times 10^9$/l (10 900/mm^3), 82% neutrophils; and erythrocyte sedimentation rate 50 mm in the first hour. Stool culture grew *S typhimurium*, phage type U129-014. Aspirate from the left knee joint was cloudy, contained polymorphs but no organisms, was sterile on culture, and had a protein content of 51 g/l. Radiographs of affected joints, feet, and sacroiliac joints were normal. Antistreptolysin titre, tests for rheumatoid and antinuclear factors, gonococcal complement fixation test, Wassermann reaction, and tine test were negative. Throat swab and urine and blood cultures were sterile. Chest *x*-ray appearances and electrocardiogram were normal. HLA typing yielded A2, AW19, B7, and B27.

She was treated with bed rest and small doses of aspirin, and when the stool culture report was obtained ampicillin was started. The conjunctivitis and dysuria cleared rapidly but she developed tenderness of the left heel and inflammation of the left ankle and right knee joints. During the next 10 days her joint symptoms fluctuated and over the next month gradually settled. One month after admission fever, abdominal pain, and diarrhoea developed and *S typhimurium* was again isolated from her stools, but her joint symptoms did not relapse.

One year after the initial illness she was well and fully mobile and her stools were free of salmonellae. She had some residual synovial thickening in the right knee joint.

Comments

In 1916 Hans Reiter described a soldier who developed the triad of conjunctivitis, urethritis, and polyarthritis after an attack of bloody diarrhoea. Since then the disease has been described in many adults after shigella dysentery and also after non-gonococcal urethritis. A few cases have occurred in children, mostly after diarrhoeal illnesses.[1] In salmonellosis a bacterial arthritis may occur, the organism usually being cultured from the joint fluid.[2] In addition a non-bacterial reactive arthritis has been described[3 4] and shown to be associated witn HLA-B27, which is commonly found in Reiter's disease.[5] Vartiainen and Hurri[3] described 12 patients in whom polyarthritis followed infection with *S typhimurium*, one of them also having conjunctivitis and iritis. Berglöf[4] described a man with *S typhimurium* infection who developed polyarthritis, conjunctivitis, urethritis, and prostatitis and had *x*-ray changes in the sacroiliac joints. Neither paper mentioned Reiter's disease. So far as I know there have been no published case reports of Reiter's disease with salmonella infections, but in both my case and Berglöf's the association of diarrhoea with polyarthritis, conjunctivitis, and urethritis must warrant this title.

I thank Dr H V L Finlay for permission to report this case and for advice and encouragement.

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Department of Paediatrics, Hillingdon Hospital, Middlesex
ROSAMOND A K JONES, MRCP, registrar (present address: Hammersmith Hospital, London W12 OHS)

Tetrabenazine in Sydenham's chorea

Tetrabenazine is a reserpine-like compound which has an established place in the treatment of Huntington's chorea.[1 2] We report two cases of rheumatic chorea in which involuntary movements were dramatically improved by this drug.

Case reports

Case 1—A 10-year-old girl was admitted to hospital with a five-month history of difficulty in walking, slurred speech, and inability to dress herself. Her speech was severely dysarthric, and there were widespread coarse choreic movements of all limbs, which made it impossible for her to stand or to use her arms for any purposive movement. She was tearful but there were no signs of intellectual impairment. The cardiovascular system was normal and full blood count, erythrocyte sedimentation rate, measurement of electrolyte concentrations, liver function tests, antistreptolysin O titre, and chest radiography showed nothing abnormal. Treatment was begun with tetrabenazine 25 mg three times daily. Within 24 hours there was a dramatic improvement in speech and involuntary movements and after a few days she could walk and dress herself. Depression or other unwanted effects were not observed. The movements almost completely resolved after about two weeks and the medication was discontinued one month later. When last seen three years after her illness she was maintaining good health but small choreic movements were still evident.

Case 2—A 12-year-old boy was admitted to hospital with a three-week history of stiff and painful joints in the arms and legs. This resolved in two and a half weeks, but was replaced by severe, widespread, coarse choreic movements in all limbs. Feeding was impossible and he could barely walk with the aid of one person. A faint cardiac systolic murmur was detected at the apex. The anti-streptolysin O titre was raised at 600 IU/ml. Full blood count was normal and erythrocyte sedimentation rate was 44 mm in the first hour. Chest radiography and electrocardiogram were both normal. Initial treatment consisted of penicillin and diazepam which had little effect on the chorea. After one week diazepam was stopped and tetrabenazine 25 mg twice daily was given. This resulted in a dramatic lessening of involuntary movements within 24 hours, and after one week's treatment they were minimal and he could walk and feed himself unaided. Tetrabenazine was discontinued after three months. Depression was not observed and he was free from chorea until four months after discharge when he had a further episode of joint pain and chorea which again responded to tetrabenazine.

Comment

The important features shown in these two cases were the rapidity and specificity of the action of tetrabenazine. The movements were